



SNAP IT™

JR & SR
ENGINEERED TUBE PLUGS

NEAR END + FAR END PLUGGING & PLUG REMOVAL PROCEDURES



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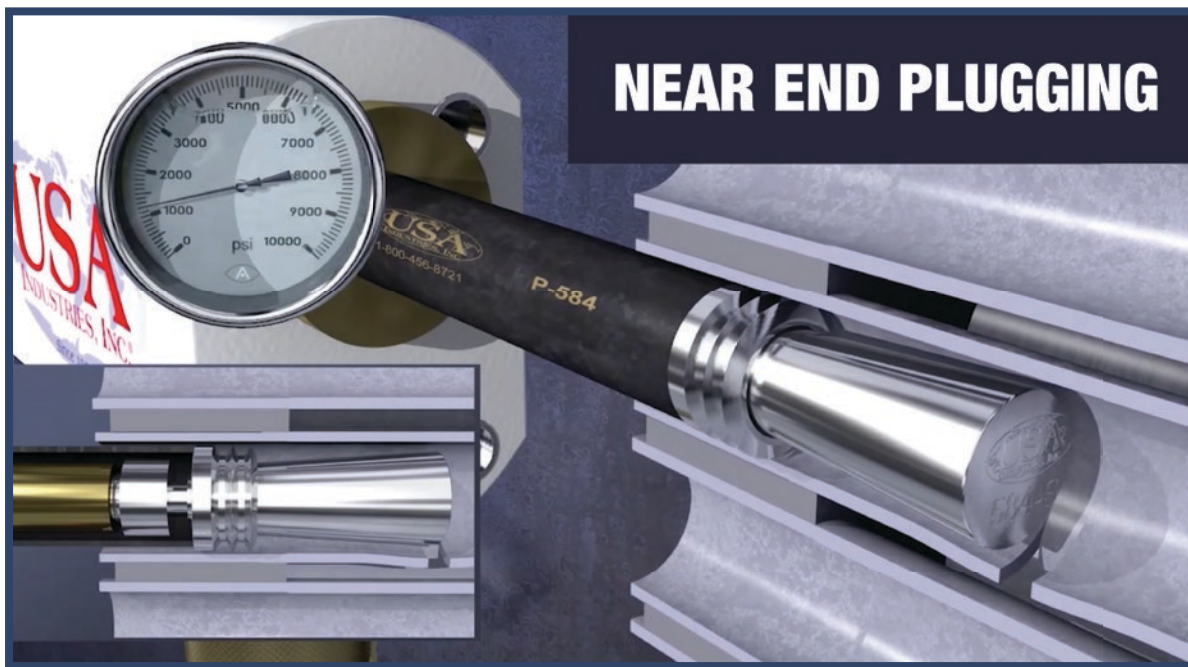
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SNAP IT™

JR & SR
ENGINEERED TUBE PLUGS

SNAP-IT JR. NEAR END PLUGGING PROCEDURES



SNAP-IT JR. NEAR END PLUGGING PROCEDURES



PLEASE READ THROUGH ALL PROCEDURES THOROUGHLY AND CAREFULLY BEFORE ATTEMPTING INSTALLATION.

1. Before Plugging

- The Snap It Jr. plug line is rated for 1000 psi of differential pressure and has standard maximum operating temperatures of the following as shown in *Table 1*. Consult factory for deviations and other materials.

Brass: 350° F / 177° C	Copper Nickel: 500° F / 260° C	Carbon Steel: 700° F / 371° C
316 SS: 900° F / 482° C	Chrome-Moly: 800° F / 426° C	Monel: 900° F / 482° C
Titanium: 900° F / 482° C	Inconel: 900° F / 482° C	Incoloy: 900° F / 482° C

Table 1: Snap It Materials Maximum Operating Temperatures

- Remove any sleeves or shields from the tube.
- It is recommended that the intended tube to be plugged is pierced just beyond the tubesheet before installation of the plug using a [USA Industries One Rev Cutter](#) (*Figure 1*) or similar tube cutting device.



Figure 1

- The tube must be cleaned using the *Jr. Brush Kit* (*Figure 2*) before plugging.
- If the tubes are welded into the tubesheet and there are weld droops that project into the tube ID, the weld droops should be removed using a *Tapered Reamer* available from USA Industries. If the tubes are not rolled into the tubesheet, **consult USA Industries at 1-(800) 456-8721** before proceeding.
- Plugs should *always* be installed into the rolled section of the tubesheet.



Figure 2

2. Reamer Procedures

- Select the appropriate sized *Reamer*.
- Keep the *Reamer* parallel with the tube ID while reaming.
- Actuate the drill at a low rpm. Let the reamer do the work by applying slight forward pressure. Never force the reamer into the tube, and only remove the weld. Removal of most weld droops should take less than 30 seconds.

SNAP-IT JR. NEAR END PLUGGING PROCEDURES

3. Brushing Procedures

- Each *Snap It Jr. plug* has a corresponding *Brush Kit*. See the chart titled “*Snap It Jr. Plug Size & Part List*” at the end of this manual for appropriate part numbers.
- Use the smallest brush from the correct *Brush Kit* that contacts the wall of the tube and slightly resists insertion into the tube.
- Secure the brush into a drill. Using the drill, turn the brush in a clockwise direction when viewed from the operator’s perspective, and insert it into the tube with an in-and-out motion parallel with the tube during operation. Be careful not to over brush the tube as it may lead to undesired thinning of the tube. Do not reverse the rotation of the brush as it will untwist and release the bristles, damaging the brush and making it impossible for further use.
- Most brushing applications should take less than 30 seconds. A properly cleaned tube should be smooth without any scale or pitting on the interior wall.

4. Jr. Plug Installation Procedures

- Using the “*Snap It Sizing Chart For Rolled Tubes*” located at the end of this manual, determine the correct size plug for the tube you are plugging. If a plug size is not clear, consult *USA Industries* for assistance.
- The *Pull Rod Assembly* must contain the following components shown in *Figure 3*.

- Pull Rod
- Plug Positioner
- Spacer
- Expansion Nut
- Safety Cable



DO NOT CONTINUE WITH PROCEDURE IF ALL FIVE COMPONENTS ARE NOT PRESENT.

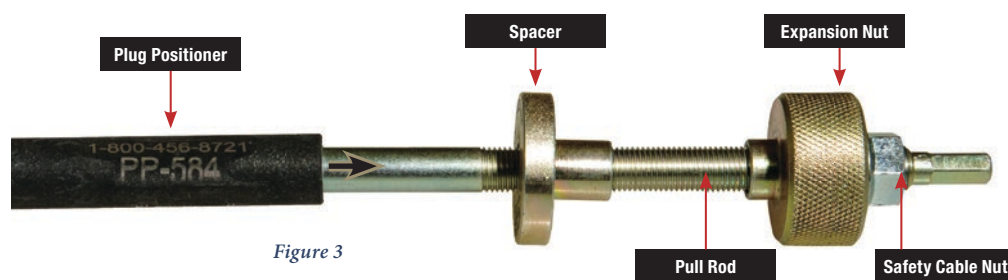


Figure 3

- Remove the *Plug Positioner* and *Spacer* from the *Pull Rod Assembly*.
- Ensure the *Ram* (*Figure 4*) is fully retracted.
- Insert the *Pull Rod* assembled with the *Expansion Nut* and *Safety Cable Nut* into the *Ram* from the side of the hydraulic *Ram* that has the large hex shaped nut attached to it as shown in *Figure 4*.
- Insert the *Spacer* onto the *Pull Rod* so that the small diameter side of the *Spacer* inserts into and is hidden by the *Ram*.

SNAP-IT JR. NEAR END PLUGGING PROCEDURES

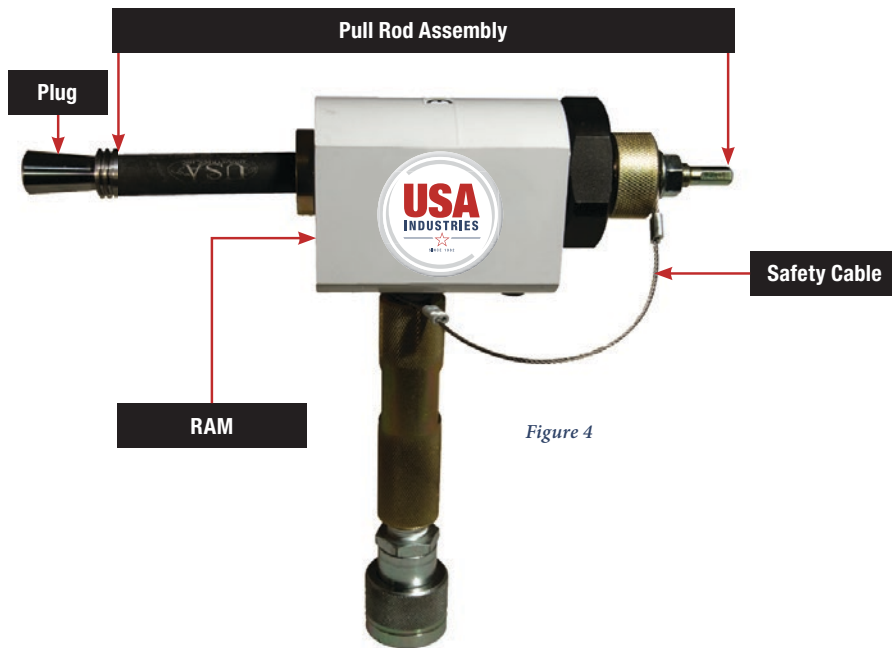


Figure 4

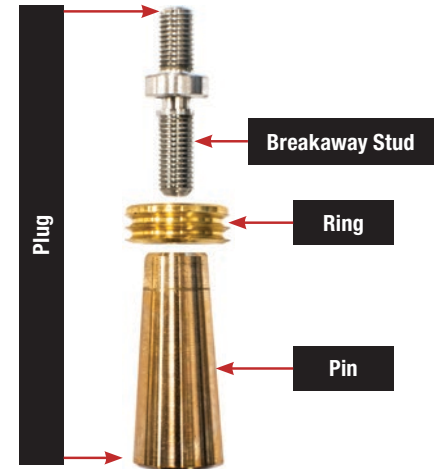


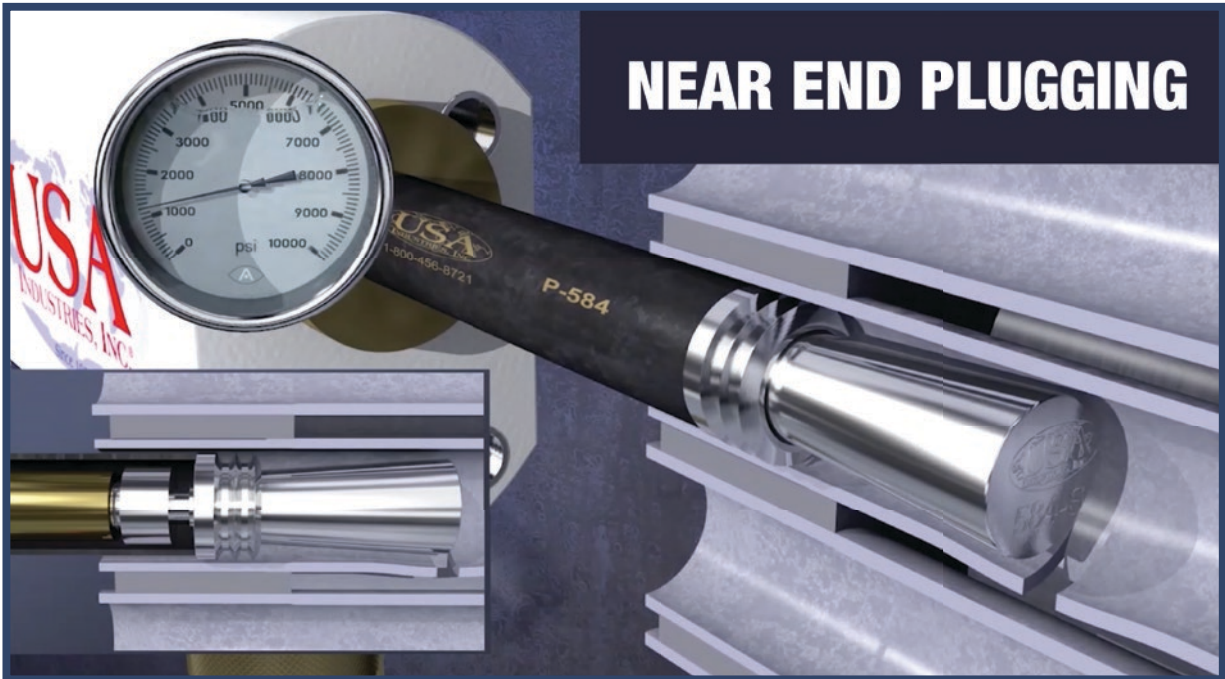
Figure 5

- g) Slide the correct size *Plug Positioner* onto the *Pull Rod* with the end showing the word "RAM" facing towards the *Ram* and the end showing the word "PLUG" facing towards the plug.
- h) Fully thread an assembled *Snap It Jr plug* into the *Pull Rod Threads* located on the side of the assembly with the *Plug Positioner*.
- i) Thread the *Expansion Nut* onto the *Pull Rod* and finger tighten so there is NO slack on the *Pull Rod Assembly*.
- j) Remove the *Safety Cable Nut* and insert the *Pull Rod* through the loop of the *Safety Cable* then reinstall the *Safety Cable Nut* by fully threading and making finger tight. **DO NOT FORGET TO ASSEMBLE THE SAFETY CABLE & NUT.** See *Figure 4* for proper *Ram* and *Pull Rod Assembly*.
- k) Ensure the tube to be plugged has been brushed, reamed, and punctured where applicable.
- l) Insert the *Plug* into the tube of the heat exchanger being plugged, making sure that the *Ring* (*Figure 5*) is located within the front and rear face of the tubesheet. If the tubesheet thickness allows, the *Plug* should be installed at a depth of approximately 1" from the top of the *Ring* to the edge of the tubesheet so the installed plugs *Pin* (see *Figure 5*) does not protrude beyond the face of the tubesheet.
- m) Actuate the *Pump* while holding the *Ram* steady and perpendicular to the tubesheet. **DO NOT STAND DIRECTLY BEHIND, HAVE ANY BODY PARTS BEHIND, OR HAVE ANYONE ELSE STANDING BEHIND THE PULL ROD ASSEMBLY.** The *Piston* in the *Ram* will extract against the *Expansion Nut* to install the *Plug*. When fully installed the *Breakaway Stud* (see *Figure 5*) of the *Plug* will break at a pre-engineered tensile load that corresponds to the size of the *Plug*. Begin the procedure again to plug another tube.
- n) If the *Stud* has not broken and the gauge on the *Pump* has exceeded 7000 psi, then release the *Pump* pressure and allow the *Ram's Piston* to fully retract and re-tighten the *Expansion Nut* to take another stroke. When this happens it usually means that the *Pin* has more length to travel and the *Piston* was fully extended bottoming out the hydraulic cylinder. If the *Stud* has not broken after the second full stroke, stop the installation and *call USA Industries at (800) 456-8721*.

SNAP IT™

JR & SR
ENGINEERED TUBE PLUGS

SNAP-IT SR. NEAR END PLUGGING PROCEDURES



Snap It Jr plug shown in illustration

SNAP-IT SR. NEAR END PLUGGING PROCEDURES



PLEASE READ THROUGH ALL PROCEDURES THOROUGHLY AND CAREFULLY BEFORE ATTEMPTING INSTALLATION.

1. Before Plugging

- The *Snap It Sr.* plug line is rated for the following differential pressure and temperature conditions (*Table 1 a & b*). Consult factory for deviations and other materials.

PLUG SIZE	MAXIMUM OPERATING DIFFERENTIAL PRESSURE
.400 - .680	7,000 PSIG
.700 - .960	4,500 PSIG
.980 - 2.000	2,000 PSIG

Table 1-a: Maximum Operating Differential Pressures

Brass: 350° F / 177° C	Copper Nickel: 500° F / 260° C	Carbon Steel: 700° F / 371° C
316 SS: 900° F / 482° C	Chrome-Moly: 800° F / 426° C	Monel: 900° F / 482° C
Titanium: 900° F / 482° C	Inconel: 900° F / 482° C	Incoloy: 900° F / 482° C

Table 1-b: Snap It Materials Maximum Operating Temperatures

- Remove any sleeves or shields from the tube.
- It is recommended that the intended tube to be plugged is pierced just beyond the tubesheet before installation of the plug using USA Industries One Rev Cutter (*Figure 1*) or similar tube cutting device.
- The tube must be symmetrical and cleaned using the *Sr. Brush Kit* (*Figure 2*) before plugging.
- If the tubes are welded into the tubesheet and there are weld droops that project into the tube ID, the weld droops should be removed using a *Tapered Reamer* available from USA Industries. If the tubes are not rolled into the tubesheet, **consult USA Industries at 1-(800) 456-8721** before proceeding.
- Plugs should *always* be installed into the rolled section of the tubesheet and approximately 1-1/2" deep when possible.



Figure 1



Figure 2

2. Reamer Procedures

- Select the appropriate sized *Reamer*.
- Keep the *Reamer* parallel with the tube ID while reaming.
- Actuate the drill at a low rpm. Let the reamer do the work by applying slight forward pressure. Never force the reamer into the tube, and only remove the weld. Removal of most weld droops should take less than 30 seconds.

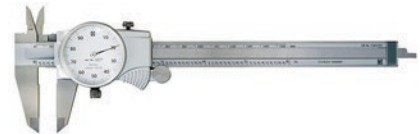
SNAP-IT SR. NEAR END PLUGGING PROCEDURES

3. Brushing Procedures

- Each *Snap It Sr. plug* has a corresponding *Brush Kit*. See the chart titled “*Snap It Sr. Plug Size & Part List*” at the end of this manual for appropriate part numbers.
- Use the smallest brush from the correct *Brush Kit* that contacts the wall of the tube and slightly resists insertion into the tube.
- Secure the brush into a drill. Using the drill, turn the brush in a clockwise direction when viewed from the operator’s perspective, and insert it into the tube with an in-and-out motion parallel with the tube during operation. Be careful not to over brush the tube as it may lead to undesired thinning of the tube. Do not reverse the rotation of the brush as it will untwist and release the bristles, damaging the brush and making it impossible for further use.
- Most brushing applications should take less than 30 seconds. A properly cleaned tube should be smooth without any scale or pitting on the interior wall.

4. Sr. Plug Installation Procedures

- Using a caliper, measure the tube ID. The *Snap It Sr. plugs* have an expansion range of .020. Consult the *Sr. Size Chart* in the Appendix for assistance in ordering the correct plug size. If a plug size is not clear, contact USA Industries for assistance.
- Ensure the proper size plug is being installed by using the *Go/No-Go gauge*. The “Go” end should be fully insertable into the tube and the “No-Go” end should not. If the No-Go end of the gauge fits into the tube, **STOP** and get the correct size plug. Contact USA Industries if you have any questions before moving forward.
- The *Pull Rod Assembly* must contain the following components shown in *Figure 4*.



- Pull Rod
- Plug Positioner
- Spacer
- Expansion Nut
- Safety Cable



DO NOT CONTINUE WITH PROCEDURE IF ALL FIVE COMPONENTS ARE NOT PRESENT.

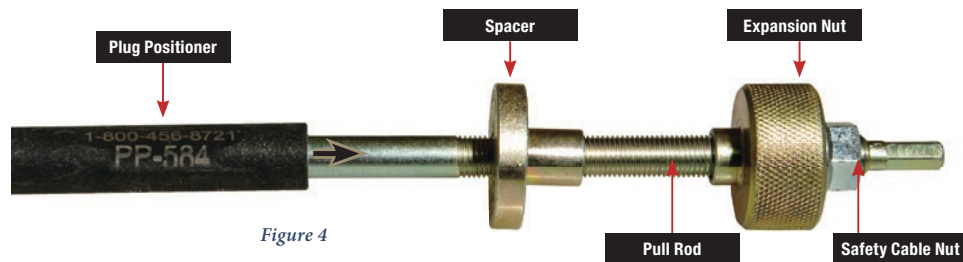


Figure 4

- Remove the *Plug Positioner* and *Spacer* from the *Pull Rod Assembly*.

SNAP-IT SR. NEAR END PLUGGING PROCEDURES

- d) Ensure the *Ram* ([Figure 5](#)) is fully retracted.

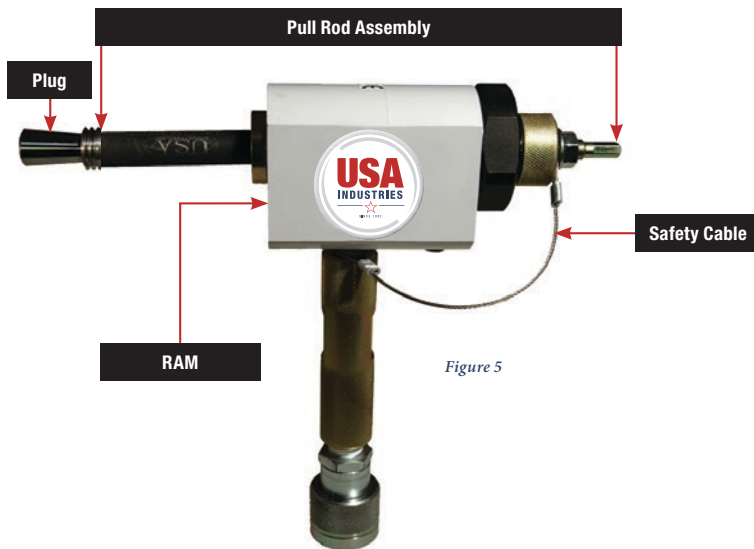


Figure 5

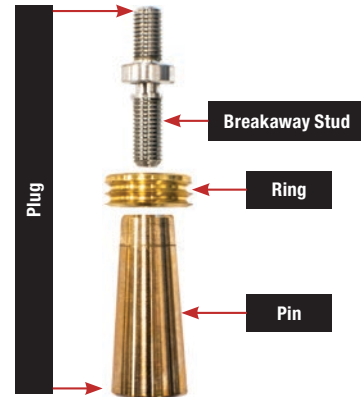
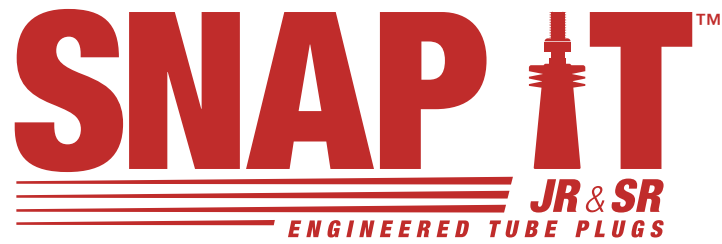


Figure 6

- e) Insert the *Pull Rod* assembled with the *Expansion Nut* and *Safety Cable Nut* into the *Ram* from the side of the hydraulic *Ram* that has the large hex shaped nut attached to it as shown in [Figure 5](#).
- f) Insert the *Spacer* onto the *Pull Rod* so that the small diameter side of the *Spacer* inserts into and is hidden by the *Ram*.
- g) Slide the correct size *Plug Positioner* onto the *Pull Rod* with the end showing the word “RAM” facing towards the *Ram* and the end showing the word “PLUG” facing towards the plug.
- h) Fully thread an assembled *Snap It Jr plug* into the *Pull Rod Threads* located on the side of the assembly with the *Plug Positioner*.
- i) Thread the *Expansion Nut* onto the *Pull Rod* and finger tighten so there is NO slack on the *Pull Rod Assembly*.
- j) Remove the *Safety Cable Nut* and insert the *Pull Rod* through the loop of the *Safety Cable* then reinstall the *Safety Cable Nut* by fully threading and making finger tight. **DO NOT FORGET TO ASSEMBLE THE SAFETY CABLE & NUT.** See [Figure 4](#) for proper *Ram* and *Pull Rod Assembly*.
- k) Ensure the tube to be plugged has been brushed, reamed, and punctured where applicable.
- l) Insert the *Plug* into the tube of the heat exchanger being plugged, making sure that the *Ring* ([Figure 5](#)) is located within the front and rear face of the tubesheet. If the tubesheet thickness allows, the *Plug* should be installed at a depth of approximately 1” from the top of the *Ring* to the edge of the tubesheet so the installed plugs *Pin* (see [Figure 5](#)) does not protrude beyond the face of the tubesheet.
- m) Actuate the *Pump* while holding the *Ram* steady and perpendicular to the tubesheet. **DO NOT STAND DIRECTLY BEHIND, HAVE ANY BODY PARTS BEHIND, OR HAVE ANYONE ELSE STANDING BEHIND THE PULL ROD ASSEMBLY.** The *Piston* in the *Ram* will extract against the *Expansion Nut* to install the *Plug*. When fully installed the *Breakaway Stud* (see [Figure 5](#)) of the *Plug* will break at a pre-engineered tensile load that corresponds to the size of the *Plug*. Begin the procedure again to plug another tube.
- n) If the *Stud* has not broken and the gauge on the *Pump* has exceeded 7000 psi, then release the *Pump* pressure and allow the *Ram's Piston* to fully retract and re-tighten the *Expansion Nut* to take another stroke. When this happens it usually means that the *Pin* has more length to travel and the *Piston* was fully extended bottoming out the hydraulic cylinder. If the *Stud* has not broken after the second full stroke, stop the installation and call USA Industries at (800) 456-8721.



SNAP IT JR. FAR END PLUGGING (FEP) PROCEDURES





SNAP IT JR. FAR END PLUGGING (FEP) PROCEDURES



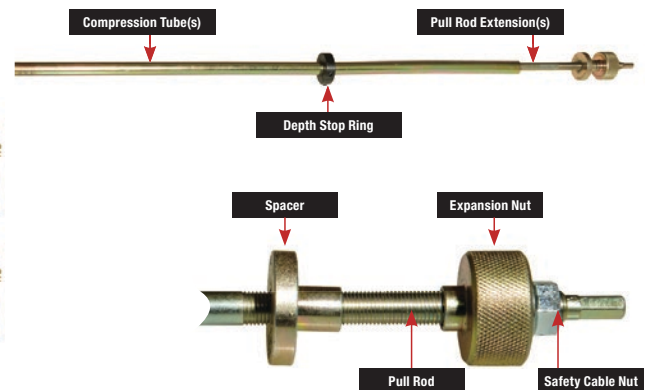
WARNING: ONLY SNAP IT JR. PLUGS CAN BE USED FOR THROUGH-THE-TUBE PLUGGING.

Restrictions on Through-The-Tube Plugging

- In many cases major deposits can build up in the ID of the tubes during operation. Heavy deposits can prevent the plug from being installed correctly. The tube ID must be clean to allow the plug to be inserted through the tube. It is recommended that the USA Industries' CG 625 Cleaning Gun (*or any other driving source*) along with the correct size FEP Brush Kit be used to prepare the tubes before plugging. However, other means of cleaning can be used such as hydroblasting, chemical cleaning, rodding or drilling.
- In some cases tubes can become bent or bowed during operation or maintenance. If the desired tube to be plugged is excessively bowed, bent or collapsed, Through-The-Tube Plugging *cannot* be performed.
- The maximum depth for Through-The-Tube Plugging is 20 ft.

Required Equipment for Through-The-Tube Plugging

1. A fully assembled hydraulic *Ram* and *Pump* set.
2. An abundant supply of *Snap-It Jr. Plugs* in the recommend size and material.
3. A sufficient supply and range of *Pull Rod Extensions* and *Compression Tubes*.
4. *Channel Head Pull Rod Assembly* and *Depth Stop* ring.
5. The correct sized *FEP Adapter Kit* for each plug.



SNAP IT JR. FAR END PLUGGING (FEP) PROCEDURES



PLEASE READ THROUGH ALL PROCEDURES THOROUGHLY AND CAREFULLY BEFORE ATTEMPTING INSTALLATION.

1. Before Plugging

1. Determine the proper *Snap It Jr. Plug* size for the application. As with any case, it is best to know the exact tube ID in the location where the plug is going to be installed; however, from knowing the tube size and gauge, one can determine the correct Snap It Jr. plug size using the *Snap It Jr. Plug Chart* – **BE SURE TO FOLLOW “FAR END” SIZING OPTION** - see (note: tube's ID may vary do to corrosion and/or erosion).
2. It is recommended that the intended tube to be plugged be pierced using a *USA Industries One Rev Cutter* (Figure 6 - or other similar device) before the installation of the plug. The plug should be installed in the rolled section of the tubesheet.



Figure 6

3. If the tubes are welded into the tubesheet and there are weld droops that project in the tube ID, the weld droops should be removed using a tapered reamer. If the tubes are not rolled into the tubesheet, *consult USA Industries at (1-800-456-8721) before proceeding.*
4. Calculate the exact depth where the plug is to be installed. **BE SURE THAT THE PLUG IS INSTALLED WITHIN THE FAR END TUBESHEET.**
 - a) Verify the tubesheet to tubesheet displacement as shown in *Figure 7*.
 - b) Verify the far end tubesheet thickness and divide by 2.
 - c) Subtract the two measurements together to obtain the exact depth the plug needs to be installed

EXAMPLE:

Tubesheet to tubesheet displacement = 14 ft. = 168 in.

Tubesheet thickness = 1.5 in. = 1.5 / 2 in. = .75 in.

Therefore, exact depth = 167.25 in. (167 ¼")

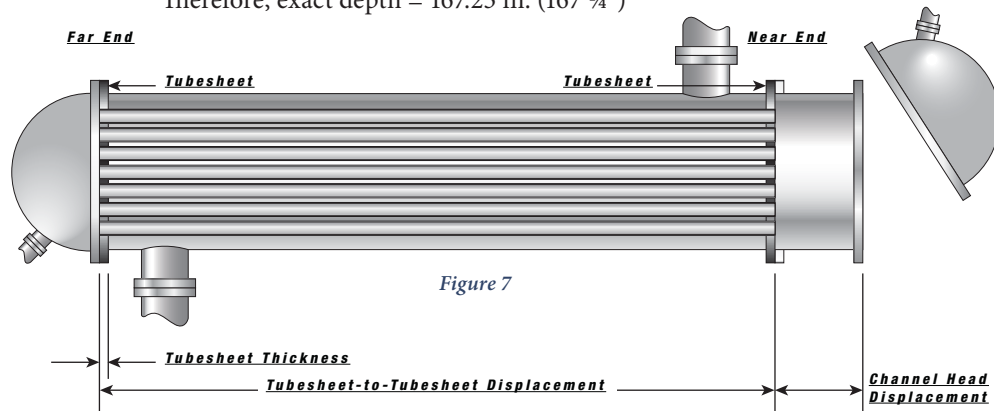


Figure 7

5. Plugs should always be installed into the rolled section of the tubesheet.

SNAP IT JR. FAR END PLUGGING (FEP) PROCEDURES

2. Plugging Procedures

1. Remove the *Breakaway Stud* from the Snap-It Jr. Plug. **IT IS IMPORTANT TO NOT DAMAGE THE SURFACE OF THE PIN.** Dispose of the *Breakaway Stud* after it has been removed from the plug. An exploded view of the assembly is shown in *Figure 8*.

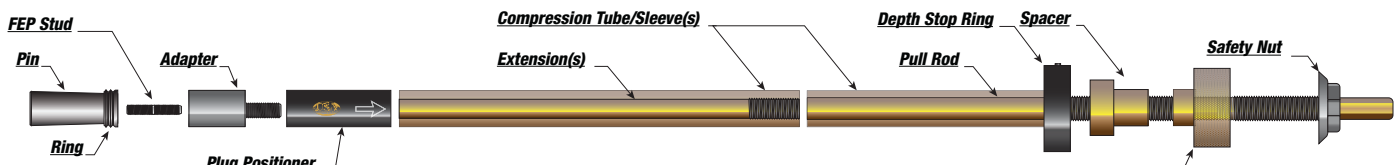


Figure 8

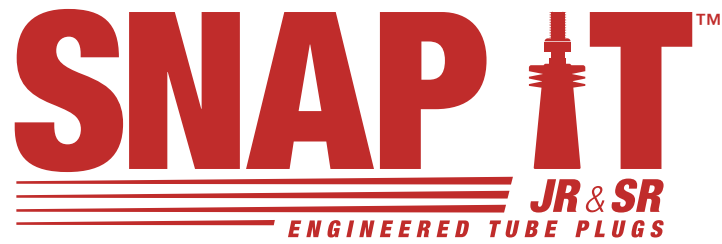
2. **FULLY** insert the right-hand-threaded side of the *FEP Stud* clockwise into the plug.
3. Insert the left-hand-threaded side of the *FEP Stud* counterclockwise into the female end of the *FEP Coupling Adapter*. Stop once the *Coupling Adapter* is fully threaded. **DO NOT OVERTIGHTEN.**
4. Insert the *Plug* and *FEP Coupling Adapter* into the first *Pull Rod Extension* while holding the *FEP Coupling* so the *Plug* and *FEP Stud* do not rotate.
5. Slide on the correct size *Plug Positioner* in the correct direction. The arrow on the *Plug Positioner* should point towards the *Pull Rod*, and away from the *Pin* and *Ring*.
6. It is recommended to assemble the total number of *Pull Rod Extensions* and *Compression Tubes* needed flat on the ground so as to not induce bending on the extensions and tubes. If space is minimal, then the *Pull Rod Extensions* and *Compression Tubes* can be assembled one by one into the tube to be plugged. Firmly tighten (**DO NOT OVERTIGHTEN**) the *Pull Rod Extensions* to ensure each piece is bottomed out (*the ends should butt together*) using a wrench if necessary on the flats near each end.
7. Once the desired displacement is obtained, thread the *Channel Head Pull Rod* into the last *Pull Rod Extension*.
8. Remove all slack by holding the last *Compression Tube* and pulling firmly on the *Pull Rod*.
9. Using the calculated depth from the example shown earlier, measure from the middle of the *Ring* on the *Plug* to the calculated depth and mark this point on the *Compression Tube*. Tighten the *Depth Stop Ring* over the *Compression Tube* at the point marked. The front portion of the *Depth Stop Ring* should be at the point marked as shown in *Figure 9*.

Figure 9



SNAP IT JR. FAR END PLUGGING (FEP) PROCEDURES

10. Slide on the *Spacer* and push it against the *Compression Tube*, while pulling on the *Pull Rod* to alleviate slack.
11. Slide on the *Ram Package* in the correct direction making sure the piston is pointing away from the plug.
12. Thread the *Expansion Nut* up against the *Ram Package* making sure there is no slack in the assembly and tighten up the *Expansion Nut*. **BE CAREFUL NOT TO LET THE PULL ROD ROTATE AS THIS MAY UNTHREAD THE FEP COUPLING ADAPTOR.**
13. If not already done, insert the Assembly into the heat exchanger tube to the point at which the *Depth Stop Ring* is touching the beginning of the tubesheet. **BE CAREFUL NOT TO BEND OR ALLOW THE ASSEMBLY TO BOW DURING INSERTION.**
14. **DO NOT FORGET TO PLACE THE SAFETY CABLE AND NUT ON THE PULL ROD.**
15. Review the chart on page 6 - *Figure 5* to install the plug to the correct pull pressure. To obtain the correct installation, more than one stroke on the *Ram Package* is needed.
16. Follow these steps to ensure the plug is properly installed **BE SURE NO ONE IS STANDING OR HAS BODY PARTS DIRECTLY BEHIND THE PULL ROD ASSEMBLY:**
 - a. Actuate the *Pump* until the appropriate pull pressure is achieved.
 - b. Release the pressure and allow the *Ram* to fully retract.
 - c. Hand tighten the *Expansion Nut* until all slack is removed. **BE CAREFUL TO NOT ALLOW THE PULL ROD TO ROTATE.**
 - d. Actuate the *Pump* until the appropriate pull pressure is achieved again.
 - e. Repeat steps (b.) thru (d.) until the *Expansion Nut* can be turned *LESS THAN* 1/4th of one revolution.
17. Once the *Plug* has been properly installed, retract the *Ram* and remove the *Expansion Nut*. **BE CAREFUL TO NOT ALLOW THE PULL ROD TO ROTATE**
18. Remove the *Ram* from the *Pull Rod*.
19. Turn the *Pull Rod* clockwise using a wrench on the hexed end of the *Pull Rod* until the *FEP Coupling Adaptor* has fully unthreaded from the left-hand-threads of the *FEP Stud*. The *FEP Stud* will remain in the *Plug*.
20. Pull the entire assembly out of the heat exchanger tube making sure that the assembly does not bend or is allowed to fall back onto the installed plug as this could dislodge or loosen the *Pin to Ring* contact and allow the *Plug* to leak.
21. Repeat steps for the remaining tubes.



SNAP IT PLUG REMOVAL PROCEDURES



SNAP IT PLUG REMOVAL PROCEDURES

- USA Industries supplies a manual *Plug Removal Tool* assembly for extracting *Plugs*. There are multiple sizes of *Spears* to accommodate any size *Plug* along with a threaded insert to capture the *Pin*. To determine the correct *Spear* size, a sizing chart is shown in *Figure 10*. The *Plug Removal Tool* assembly comes complete with a threaded *Shaft*, two *Lock Nuts*, *End Cap*, *Slide Hammer* and *Spear*. A full assembly of the *Plug Removal Tool* is shown in *Figure 11*.

JR. Plug	Spear Size	Sr. Plug	Spear Size
471-555	1	460-580	1
584-649	2	600-680	2
670-735	3	700-780	3
774-853	5	800-860	4
899-962	6	880-960	7
979-1054	7	980-1060	8
1087-1149	8	1080-1160	9
1171-1212	9		

Figure 10

- First begin by unthreading the left over *Breakaway Stud* in the *Pin* from installation if was not previously been done. With the insert on the end of the *Spear*, thread the *Spear* into the *Pin*.
- Using a hammer or mallet, knock the *Spear* forward to dislodge the *Pin* from the *Ring*. This can also be accomplished by using the *Plug Removal Tool* assembly by ramming the *Slide Hammer* forward to dislodge the *Pin*.
- Now, using a crescent wrench, torque the *Spear* clockwise into the ID of the *Ring*. Keep torquing until the *Spear* feels firm with the *Ring*.

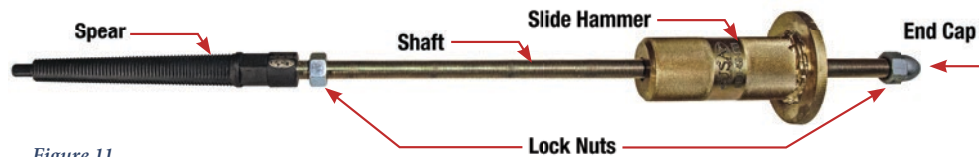


Figure 11

- With a **HARD ABRUPT FORCE** using the *Slide Hammer*, knock the *Ring* from the tube. Depending on the *Ring* material and size and condition of the tube, it may take a few knocks to dislodge the *Ring*. If the *Ring* does not dislodge or appears to not be moving, then proceed to step 7.
- Once the *Ring* has been dislodged from the tube, remove the *Ring* from the *Spear* using channel-locks. The *Pin* and *Ring* should be discarded.
- The *Plug* can also be removed using the *Plug Removal Tool* and *Ram*. The assembly is basically the same except the *Slide Hammer* is replaced by the *Ram* and the *Tool Removal Nosepiece* is used for bracing. An example of the *Plug Removal Tool* with the *Ram* is shown in *Figure 12*.

SNAP IT PLUG REMOVAL PROCEDURES

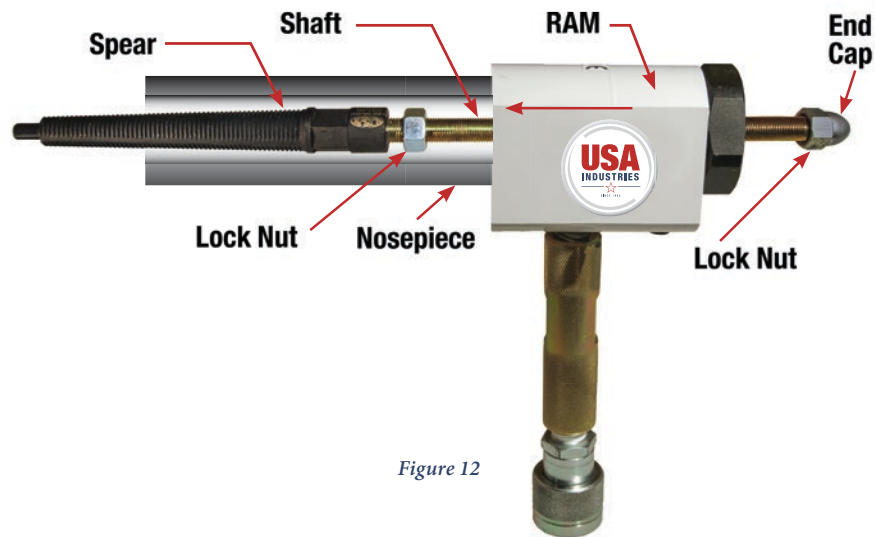
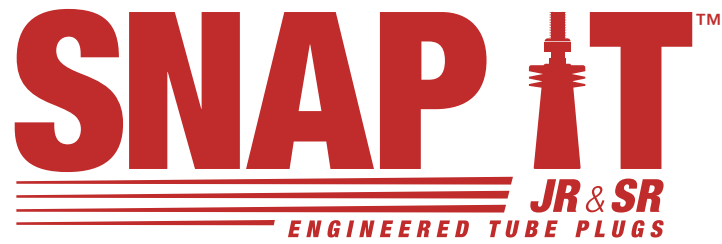


Figure 12

8. Perform steps 2 to 4 procedures. Now take off the *Slide Hammer* and *Lock Nuts*; apply the *Tool Removal Coupling*. This should couple over the *Spear* and brace-up against the tubesheet. **BE CAREFUL NOT TO DAMAGE ANY TUBES.**
9. Next, slide the *Ram* on the *Shaft* and press it against the *Coupling*. Make sure the piston in the *Ram* is facing away from the heat exchanger. Now thread on the *Lock Nuts* against the piston on the *Ram*.
10. Engage the *Pump* to extract the *Ring*. One or more strokes on the *Ram* may be needed to fully extract the *Ring*. Once the *Ring* and *Pin* have been extracted, repeat step 6.

**IF THE RING WILL NOT DISLodge FROM THE TUBE CALL USA INDUSTRIES
AT 1-800-456-8721 FOR CONSULTATION.**



APPENDIX: SNAP IT CHARTS



SNAP-IT JR. PLUG SIZE & PART LIST

Plug #	Plug Range - Tube ID IN. (mm)	Pin Length IN. (mm)	Brush Kit	Positioner	Pull Rod	Channel Head Pull Rod
JR - 471 - "<>"	0.472 - 0.515 (11.99 - 13.08)	1.63 (41.4)	JRA - 471 - "[]"	PP-471	I	CHPRA - "{}" - I
JR - 491 - "<>"	0.492 - 0.540 (12.50 - 13.72)	1.67 (42.4)	JRA - 491 - "[]"	PP-491		
JR - 512 - "<>"	0.513 - 0.562 (13.03 - 14.27)	1.59 (40.3)	JRA - 512 - "[]"	PP-512		
JR - 524 - "<>"	0.525 - 0.585 (13.34 - 14.86)	1.28 (32.5)	JRA - 524 - "[]"	PP-524		
JR - 555 - "<>"	0.556 - 0.616 (14.12 - 15.65)	1.40 (35.6)	JRA - 555 - "[]"	PP-555		
JR - 584 - "<>"	0.585 - 0.649 (14.86 - 16.48)	1.32 (35.5)	JRA - 584 - "[]"	PP-584	II	CHPRA - "{}" - II
JR - 621 - "<>"	0.622 - 0.689 (15.80 - 17.50)	1.57 (39.9)	JRA - 621 - "[]"	PP-621		
JR - 649 - "<>"	0.650 - 0.713 (16.51 - 18.11)	1.32 (35.5)	JRA - 649 - "[]"	PP-649		
JR - 670 - "<>"	0.671 - 0.740 (17.04 - 18.80)	1.66 (42.2)	JRA - 670 - "[]"	PP-670		
JR - 712 - "<>"	0.713 - 0.777 (18.11 - 19.74)	1.32 (35.5)	JRA - 712 - "[]"	PP-712		
JR - 735 - "<>"	0.736 - 0.810 (18.69 - 20.57)	1.68 (42.7)	JRA - 735 - "[]"	PP-735	III	CHPRA - "{}" - III
JR - 774 - "<>"	0.775 - 0.838 (19.69 - 21.29)	1.32 (35.5)	JRA - 774 - "[]"	PP-774		
JR - 804 - "<>"	0.805 - 0.890 (20.45 - 22.61)	1.7 (43.2)	JRA - 804 - "[]"	PP-804		
JR - 837 - "<>"	0.838 - 0.902 (21.29 - 22.91)	1.32 (35.5)	JRA - 837 - "[]"	PP-837		
JR - 853 - "<>"	0.854 - 0.949 (21.69 - 24.10)	1.72 (43.7)	JRA - 853 - "[]"	PP-853		
JR - 899 - "<>"	0.900 - 0.963 (22.86 - 24.46)	1.32 (35.5)	JRA - 899 - "[]"	PP-899		
JR - 919 - "<>"	0.920 - 1.019 (23.37 - 25.88)	1.76 (44.7)	JRA - 919 - "[]"	PP-919		
JR - 962 - "<>"	0.963 - 1.027 (24.46 - 26.09)	1.32 (35.5)	JRA - 962 - "[]"	PP-962		
JR - 979 - "<>"	0.980 - 1.079 (24.89 - 27.41)	1.82 (46.2)	JRA - 979 - "[]"	PP-979		
JR - 1024 - "<>"	1.025 - 1.088 (26.04 - 27.64)	1.32 (35.5)	JRA - 1024 - "[]"	PP-1024		
JR - 1054 - "<>"	1.055 - 1.156 (26.80 - 29.31)	1.90 (48.3)	JRA - 1054 - "[]"	PP-1054		
JR - 1087 - "<>"	1.088 - 1.152 (27.65 - 29.26)	1.32 (35.5)	JRA - 1087 - "[]"	PP-1087		
JR - 1103 - "<>"	1.104 - 1.203 (28.04 - 30.56)	1.90 (48.3)	JRA - 1103 - "[]"	PP-1103		
JR - 1149 - "<>"	1.150 - 1.213 (29.21 - 30.81)	1.32 (35.5)	JRA - 1149 - "[]"	PP-1149		
JR - 1171 - "<>"	1.172 - 1.270 (29.77 - 32.26)	2.00 (50.8)	JRA - 1171 - "[]"	PP-1171		
JR - 1212 - "<>"	1.213 - 1.336 (30.81 - 33.93)	2.00 (50.8)	JRA - 1212 - "[]"	PP-1212		

Substitute the suffix "<>" with the following material code: **C** - carbon steel, **S** - 316 stainless steel, **B** - brass, **Y** - Cr/Moly, **M** - monel, **K** - 90/10 CuNi, **J** - 70/30 CuNi. Other materials available.

"[]" For brass, copper, or copper-nickel tubes add the suffix - **LD** to the Brush Kit Tube Preparation Brushes

"{}" Channel Head Pull Rod Assemblies are available in 2', 4', or 6' lengths. Insert the appropriate # for the length required.



SNAP IT JR. FAR END PLUGGING (FEP) PROCEDURES

JR. PLUG SIZE	MAX. PRESSURE INDICATED ON RAM PACKAGE GAUGE (PSI)
512	2300
524	2600
555	3000
584	3200
621	3600
649	4000
670	4000
712	4400
735	4400
774	5400
804	5400
837	5400
853	5400
899	5800
919	5800
962	5800
979	5800
1024	6300
1054	6300
1087	6300
1103	6300
1149	6500
1171	6500
1212	6500

Figure 5



SNAP IT JR SIZING CHART FOR NEAR END & FAR END PLUGGING

	TUBE GAUGE		TUBE O.D. (in.)					
	BWG	WALL THICKNESS	5/8	3/4	7/8	1	1-1/4	1-1/2
ROLLED I.D.	8	-	-	-	.578	.703	.953	1.203
NEAR END	8	-	-	-	555- "<>"	670- "<>"	919- "<>"	1171- "<>"
FAR END	8	-	-	-	524- "<>"	649- "<>"	899- "<>"	1171- "<>"
ROLLED I.D.	9	0.148	-	.484	.609	.734	.984	1.234
NEAR END	9	0.148	-	471- "<>"	584- "<>"	712- "<>"	979- "<>"	1212- "<>"
FAR END	9	0.148	-	471- "<>"	555- "<>"	670- "<>"	919- "<>"	1171- "<>"
ROLLED I.D.	10	0.134	-	.509	.634	.759	1.009	1.259
NEAR END	10	0.134	-	491- "<>"	621- "<>"	735- "<>"	979- "<>"	1212- "<>"
FAR END	10	0.134	-	471- "<>"	584- "<>"	712- "<>"	962- "<>"	1171- "<>"
ROLLED I.D.	11	0.12	-	.534	.659	.784	1.034	1.284
NEAR END	11	0.12	-	524- "<>"	649- "<>"	774- "<>"	1024- "<>"	1212- "<>"
FAR END	11	0.12	-	491- "<>"	621- "<>"	735- "<>"	979- "<>"	1212- "<>"
ROLLED I.D.	12	0.109	-	.554	.679	.804	1.054	1.304
NEAR END	12	0.109	-	524- "<>"	670- "<>"	774- "<>"	1024- "<>"	1212- "<>"
FAR END	12	0.109	-	512- "<>"	621- "<>"	735- "<>"	979- "<>"	1212- "<>"
ROLLED I.D.	13	0.095	-	.579	.704	.829	1.079	1.329
NEAR END	13	0.095	-	555- "<>"	670- "<>"	804- "<>"	1054- "<>"	1212- "<>"
FAR END	13	0.095	-	524- "<>"	649- "<>"	774- "<>"	1024- "<>"	1212- "<>"
ROLLED I.D.	14	0.083	.476	.601	.726	.851	1.101	
NEAR END	14	0.083	471- "<>"	584- "<>"	712- "<>"	837- "<>"	1087- "<>"	
FAR END	14	0.083	-	555- "<>"	670- "<>"	804- "<>"	1054- "<>"	
ROLLED I.D.	15	0.072	.495	.620	.745	.870	1.120	
NEAR END	15	0.072	491- "<>"	584- "<>"	735- "<>"	853- "<>"	1103- "<>"	
FAR END	15	0.072	471- "<>"	584- "<>"	712- "<>"	837- "<>"	1054- "<>"	
ROLLED I.D.	16	0.065	.508	.633	.758	.883	1.133	
NEAR END	16	0.065	491- "<>"	621- "<>"	735- "<>"	853- "<>"	1103- "<>"	
FAR END	16	0.065	471- "<>"	584- "<>"	712- "<>"	837- "<>"	1054- "<>"	
ROLLED I.D.	17	0.058	.521	.646	.771	.896	1.146	
NEAR END	17	0.058	512- "<>"	621- "<>"	735- "<>"	853- "<>"	1103- "<>"	
FAR END	17	0.058	491- "<>"	584- "<>"	735- "<>"	853- "<>"	1103- "<>"	
ROLLED I.D.	18	0.049	.537	.662	.770	.912	1.162	
NEAR END	18	0.049	524- "<>"	649- "<>"	774- "<>"	899- "<>"	1149- "<>"	
FAR END	18	0.049	491- "<>"	621- "<>"	735- "<>"	853- "<>"	1103- "<>"	
ROLLED I.D.	19	0.042	.549	.674	.799	.924	1.174	
NEAR END	19	0.042	524- "<>"	649- "<>"	774- "<>"	899- "<>"	1149- "<>"	
FAR END	19	0.042	512- "<>"	621- "<>"	735- "<>"	853- "<>"	1149- "<>"	
ROLLED I.D.	20	0.035	.562	.687	.812	.937	1.187	
NEAR END	20	0.035	524- "<>"	649- "<>"	774- "<>"	899- "<>"	1149- "<>"	
FAR END	20	0.035	524- "<>"	649- "<>"	774- "<>"	853- "<>"	1149- "<>"	
ROLLED I.D.	21	0.032	.567	.692	.817	.942	1.192	
NEAR END	21	0.032	555- "<>"	670- "<>"	804- "<>"	919- "<>"	1171- "<>"	
FAR END	21	0.032	524- "<>"	649- "<>"	774- "<>"	853- "<>"	1149- "<>"	
ROLLED I.D.	22	0.028	.575	.700	.825	.950	1.200	
NEAR END	22	0.028	555- "<>"	670- "<>"	804- "<>"	919- "<>"	1171- "<>"	
FAR END	22	0.028	524- "<>"	649- "<>"	774- "<>"	919- "<>"	1171- "<>"	
ROLLED I.D.	23	0.025	.580	.705	.830	.955	1.205	
NEAR END	23	0.025	555- "<>"	670- "<>"	804- "<>"	919- "<>"	1171- "<>"	
FAR END	23	0.025	555- "<>"	670- "<>"	804- "<>"	919- "<>"	1171- "<>"	
ROLLED I.D.	24	0.022	.585	.710	.835	.960	1.210	
NEAR END	24	0.022	555- "<>"	670- "<>"	804- "<>"	919- "<>"	1171- "<>"	
FAR END	24	0.022	555- "<>"	670- "<>"	804- "<>"	899- "<>"	1171- "<>"	

All tube inner diameters listed are based upon a 10% wall reduction

NOTES:

- 1) Tube ID's often vary between inlet & outlet due to corrosion and/or erosion, this chart used as Reference only.
- 2) Tube Preparation Brushes are required for use with all Jr Plugs.

Substitute the suffix "<>" with the following material code:

C = Carbon Steel
B = Brass
S = 316 SS
J = 70/30 CuNi

K = 90/10 CuNi
Y = Chrome/Moly
M = Monel
I = Inconel

N = Nickel 200
T = Titanium
H = Hastelloy
Z = Zirconium



SNAP-IT SR. PLUG SIZE & PART LIST

SR KIT PART NO.	PLUG RANGE - TUBE ID IN. (MM)	BRUSH KIT	POSITIONER	PLUG POSITIONER	PULL ROD ASSEMBLY	CHANNEL HEAD PULL ROD
SR - 400 - "<>"	0.401 - 0.420 (10.16 - 10.68)	SRA - 400 - "[]"	PP - 400	PP 400 - 440	I	CHPRA - "{ }" - I
SR - 420 - "<>"	0.421 - 0.440 (10.69 - 11.19)	SRA - 420 - "[]"	PP - 420			
SR - 440 - "<>"	0.441 - 0.460 (11.20 - 11.70)	SRA - 440 - "[]"	PP - 440			
SR - 460 - "<>"	0.461 - 0.480 (11.71 - 12.21)	SRA - 460 - "[]"	PP - 460	PP 460 - 500		
SR - 480 - "<>"	0.481 - 0.500 (12.22 - 12.72)	SRA - 480 - "[]"	PP - 480			
SR - 500 - "<>"	0.501 - 0.520 (12. 73 - 13.22)	SRA - 500 - "[]"	PP - 500			
SR - 520 - "<>"	0.521 - 0.540 (13.23 - 13.73)	SRA - 520 - "[]"	PP - 520	PP 520 - 580		
SR - 540 - "<>"	0.541 - 0.560 (13.74 - 14.24)	SRA - 540 - "[]"	PP - 540			
SR - 560 - "<>"	0.561 - 0.580 (14.25 - 14.75)	SRA - 560 - "[]"	PP - 560			
SR - 580 - "<>"	0.581 - 0.600 (14.76 - 15.26)	SRA - 580 - "[]"	PP - 580			
SR - 600 - "<>"	0.601 - 0.620 (15.27 - 15.76)	SRA - 600 - "[]"	PP - 600			
SR - 620 - "<>"	0.621 - 0.640 (15.77 - 16.27)	SRA - 620 - "[]"	PP - 620			
SR - 640 - "<>"	0.641 - 0.660 (16.28 - 16.78)	SRA - 640 - "[]"	PP - 640			
SR - 660 - "<>"	0.661 - 0.680 (16.79 - 17.27)	SRA - 660 - "[]"	PP - 660			
SR - 680 - "<>"	0.681 - 0.700 (17.28 - 17.79)	SRA - 680 - "[]"	PP - 680			
SR - 700 - "<>"	0.701 - 0.720 (17.80 - 18.30)	SRA - 700 - "[]"	PP - 700	PP 700 - 780		
SR - 720 - "<>"	0.721 - 0.740 (18.31 - 18.81)	SRA - 720 - "[]"	PP - 720			
SR - 740 - "<>"	0.741 - 0.760 (18.82 - 19.32)	SRA - 740 - "[]"	PP - 740			
SR - 760 - "<>"	0.761 - 0.780 (19.33 - 19.83)	SRA - 760 - "[]"	PP - 760			
SR - 780 - "<>"	0.781 - 0.800 (19.84 - 20.34)	SRA - 780 - "[]"	PP - 780			
SR - 800 - "<>"	0.801 - 0.820 (20.35 - 20.84)	SRA - 800 - "[]"	PP - 800	PP 800 - 860		
SR - 820 - "<>"	0.821 - 0.840 (20.85 - 21.35)	SRA - 820 - "[]"	PP - 820			
SR - 840 - "<>"	0.841 - 0.860 (21.36 - 21.86)	SRA - 840 - "[]"	PP - 840			
SR - 860 - "<>"	0.861 - 0.880 (21.87 - 22.37)	SRA - 860 - "[]"	PP - 860			
SR - 880 - "<>"	0.881 - 0.900 (22.38 - 22.87)	SRA - 880 - "[]"	PP - 880		PP 880 - 960	
SR - 900 - "<>"	0.901 - 0.920 (22.88 - 23.38)	SRA - 900 - "[]"	PP - 900			
SR - 920 - "<>"	0.921 - 0.940 (23.39 - 23.87)	SRA - 920 - "[]"	PP - 920			
SR - 940 - "<>"	0.941 - 0.960 (23.88 - 24.40)	SRA - 940 - "[]"	PP - 940			
SR - 960 - "<>"	0.961 - 0.980 (24.41 - 24.89)	SRA - 960 - "[]"	PP - 960			
SR - 980 - "<>"	0.981 - 1.000 (24.90 - 25.40)	SRA - 980 - "[]"	PP - 980	PP 980 - 1060		
SR - 1000 - "<>"	1.001 - 1.020 (25.41 - 25.91)	SRA - 1000 - "[]"	PP - 1000			
SR - 1020 - "<>"	1.021 - 1.040 (25.92 - 26.42)	SRA - 1020 - "[]"	PP - 1020			
SR - 1040 - "<>"	1.041 - 1.060 (26.43 - 26.92)	SRA - 1040 - "[]"	PP - 1040			
SR - 1060 - "<>"	1.061 - 1.080 (26.93 - 27.43)	SRA - 1060 - "[]"	PP - 1060			
SR - 1080 - "<>"	1.081 - 1.100 (27.44 - 27.94)	SRA - 1080 - "[]"	PP - 1080	PP 1080 - 1160		
SR - 1100 - "<>"	1.101 - 1.120 (27.95 - 28.45)	SRA - 1100 - "[]"	PP - 1100			
SR - 1120 - "<>"	1.121 - 1.140 (28.46 - 28.96)	SRA - 1120 - "[]"	PP - 1120			
SR - 1140 - "<>"	1.141 - 1.160 (28.97 - 29.46)	SRA - 1140 - "[]"	PP - 1140			
SR - 1160 - "<>"	1.161 - 1.180 (29.47 - 29.97)	SRA - 1160 - "[]"	PP - 1160			

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"[]" For brass, copper, or copper-nickel tubes add the suffix - **LD** to the Brush Kit Tube Preparation Brushes

"{ }" Channel Head Pull Rod Assemblies are available in 2', 4', or 6' lengths. Insert the appropriate # for the length required.